DRAFT

WORK PLAN

Characterization of the Coral Reef Ecosystem Around Vieques, Puerto Rico

Prepared
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By

NOAA/NOS/NCCOS
Center for Coastal Monitoring and Assessment
Biogeography Team

A Cooperative Investigation by NOS' Center for Coastal Monitoring and Assessment Biogeography Team and the Office of Response and Restoration

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GOAL

The National Oceanic and Atmospheric Administration's (NOAA) Biogeography Team (BT), in consultation with NOAA's Office of Response and Restoration (OR&R) and other local and regional experts, will conduct a characterization of coral reef ecosystems around Vieques Island, Puerto Rico. This work is an expansion of ongoing monitoring work in Puerto Rico and the Caribbean, using standardized protocols that will enable the condition of the coral reef ecosystems around Vieques to be evaluated in the context of the rest of the Commonwealth, the U.S. Caribbean and the nation as a whole. The assessment will support effective management and conservation of marine resources in Vieques as a whole. Anticipated activities and products include: 1) an integrated discussion of prior research on the living marine resources around Vieques, 2) a broad-scale characterization of nearshore areas of Vieques including new data on fish and benthic communities 3) analysis and discussion of new data in the context of prior studies, and 4) a strategy for continuing monitoring efforts for Vieques as part of an integrated monitoring program for the U.S. Caribbean.

OBJECTIVES

1. Synthesize the results of coral reef ecosystem studies of Vieques resources that have been conducted to date (as available and relevant).
2. Collect monitoring data in Vieques to complement previous efforts and provide a broad characterization of benthic communities, fish and coral reefs. Data collection efforts will be stratified by habitat type, prior marine zoning, watershed outflow points, and other relevant factors as identified by objective 1.
3. Analyze the collected data to determine the relative health of Vieques coral reef ecosystems in the context of territorial, regional, and national ecosystem condition.
4. Provide results for use in the Puerto Rico chapter of the 2008 "State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States."
5. Provide spatial framework depicting current and historical distributions of marine habitats.
6. Propose an appropriate monitoring strategy for the coral reef ecosystem resources in Vieques in an effort to achieve long-term monitoring objectives at all levels, including the local community, the Puerto Rico Department of Natural Resources, and NOAA's National Coral Reef Ecosystem Monitoring Program.

BACKGROUND

Since the 1940s, portions of the Island of Vieques, Puerto Rico have been used by the United States Navy (USN) as an ammunition support detachment and a naval training range, which included an area designated as a military target for training exercises with live artillery. During this period, virtually all civilian activity was restricted in these zones. Beginning in April 2001, the USN began phasing out military activities on the island and transferring military property to the U.S. Department of the Interior, the Municipality of

Vieques, and the Puerto Rico Conservation Trust. A small number of studies of the coral reef ecosystems surrounding the island were commissioned by the USN in the past few decades to establish a baseline assessments of the reef habitats (e.g., Geo-Marine 2003); however these studies were generally of limited geographic scope and short duration. To date, a comprehensive discussion of all available ecological data for the marine areas of Vieques has not been conducted.

PROJECT OVERVIEW

The NCCOS/CCMA BT, in consultation with OR&R, will conduct a broad-scale characterization of Vieques' coral reef ecosystems as part of NOAA's National Coral Reef Ecosystem Monitoring Program (NCREMP). Although the Commonwealth of Puerto Rico is currently part of this program, monitoring efforts undertaken to date have primarily concentrated on the main island. Expansion of long-term monitoring efforts using standardized protocols to Vieques would enable the condition of coral reef ecosystems there to be evaluated in the context of the rest of the Commonwealth and the U.S. Caribbean. Furthermore, the proposed monitoring work would ensure that Vieques data would be represented in the next release of The State of Coral Reef Ecosystems of the U.S. and Pacific Freely Associated States, which is currently slated for publication in 2008.

The approach to characterizing the island's coral reef ecosystems will consist of two main components. First, available information from previous studies will be gathered and integrated into a single document describing the islands marine ecology. This will include available data on reefs, fish, birds, seagrasses, turtles, mangroves, climate, geology, currents, and human uses. Once integrated into a unified characterization, a suite of field surveys will be designed to fill in gaps from prior studies and further characterize marine habitats, organisms, and human impacts.

New data collected as part of this project will be entered into a web-enabled database that has been used to store and analyze data collected throughout the U.S. Caribbean by the CCMA BT since 1999. The database, and thus the data proposed for collection under this project, is publicly-accessible without cost to users through a web-based interface. In addition, we will provide analysis of the information and findings of new data into the data integration component of the study. The report and data will be transmitted to the funding source and made available to the Vieques community. The report will also propose a strategy for monitoring the coral reef ecosystems of Vieques in the future as a part of an expanded integrated monitoring program throughout the U.S. Caribbean.

Questions to be addressed by this study include:

1. What is the extent of the current knowledge and existing data sets on the natural resources and environmental condition in Vieques, PR?
2. How does the distribution of natural resources and land use vary over space, and how has it changed over time?
3. What significant gaps exist in our knowledge and information of the biological and physical characteristics of the study area?
4. How can we use existing knowledge and data gaps to effectively design a long-term monitoring strategy?

PROJECT TASKS

Task 1. Work Plan and Project Implementation

(Estimated completion date: May 2006)
This work plan will describe the overall project and serve as a blueprint for implementation. Meetings and discussions will occur between the BT, NOAA's OR&R, and partners to refine objectives, tasks, and products in the work plan. As such, the work plan should be viewed as an evolving document that will be modified during early phases of this project. Once the preliminary objectives and products are defined and finalized, data collection and ecological analyses will be structured to address the study questions. The BT will work closely with collaborators to ensure that analyses address the resource management and restoration needs of the study area, and that appropriate species, habitats, physical characteristics, and data sets are used.

Task 1 Products:

- Preliminary list of deliverables
- Preliminary list of contacts to meet and/or talk with
- Kickoff meeting with partners
- A final work plan

Task 2. Collection of Spatial Data

(Estimated completion date: July 2006)
The BT will inventory and gather aerial images held by NOAA and other agencies (DoD/Navy, PR DNER, Army Corps of Engineers, IKONOS, etc.). These images will be particularly useful for evaluating how land use, land cover, and the distribution of nearshore benthic habitats have changed over time. Once images are selected, site visits will be conducted to collect ground control points to aid in the creation of orthorectified composite images.
In addition, the BT will inventory and gather all existing maps pertaining to the current and historic distribution of marine and nearshore benthic habitats, including those found in coastal lagoons (e.g., seagrass, coral reefs, mangroves) in Vieques. The need for additional mapping efforts and associated ground truthing will be assessed once gaps in existing knowledge are identified. Discussions are underway with Roy Armstrong at the University of Puerto Rico in regards to potential ROV and AUV work in nearshore benthic habitats around Vieques.

Task 2 Products:

- Inventory of available aerial images and maps in and around the Vieques region
- Collection of ground control points

Task 3. Collection of Aspatial Data

(Estimated completion date: August 2006)

Information on the available data sets and information on the natural resources of Vieques will be collected. This will occur through discussions and/or meetings with project partners and other regional experts. In particular, the BT will consult with NOAA's OR&R / Coastal Protection and Restoration Division, which is managing the Vieques Island Database and Mapping Project. Data will also be collected through searches of

peer reviewed literature, government documents, and technical reports and assessments commissioned by the Navy. In addition, the BT will assess the utility of other NOAA and NOS data holdings to determine which will be useful for analyses. Information will be collected on numerous aspects of the marine ecology of Vieques, including coral reefs, mangroves, seagrass, fish, birds, turtles, climate, geology, currents, bathymetry, and human uses.

Task 3 Products:

- Inventory of available data
- Revised list of contacts to talk and/or meet with

Task 4. Preliminary Assessment, Data Formatting, and Selection of Analytical Techniques

(Estimated completion date: September 2006)

Figure 2 shows the general analytical process that will be implemented. Once data sets are obtained, they will be formatted and organized into a preliminary database management system (DBMS) and GIS to assess their quality and content. All data acquired and used for assessment will be standardized by BT staff into a common spatial projection. With the DBMS and GIS in place, BT staff will evaluate the extent and quality of data, identify where important information gaps may exist, and select analytical techniques that may be most appropriate given the data collected and the desired products. Certain data sets may be synthesized in order to create complete data layers that span the study area. An effort will be undertaken to determine if and where independent biological and physical databases can be integrated or synthesized into new databases that support the characterization.

Task 4 Products:

- A brief report describing preliminary data collection, data assessment, and potential analytical techniques
- A preliminary list of key data gaps
- Preliminary design of field survey

Task 5. Field Data Collection

(Estimated completion date: Late 2006 or early 2007)

Once gaps in available data have been identified, a suite of field surveys will be designed to enhance the existing inventory of data. Using established protocols and monitoring methods that are consistent with other NOAA, DOI and other agencies/organizations monitoring efforts in the region, the BT will collect detailed information about the benthic habitats, fish, and invertebrate communities at approximately 70 sites around Vieques to a maximum depth of 80 ft (24m). Site selection will be stratified by habitat type (seagrass, coral-colonized hardbottom, sand, etc.), location relative to past historical use, and proximity to key watershed outflows to provide an assessment of the effect of these parameters on the living marine resources of Vieques. The BT will assess the need to collect accuracy assessment points for benthic habitat maps. The proposed two week field mission will take place in early 2007.

Task 5 Products:

- Collection of field data

Task 6. Data Analysis
(Estimated completion date: Feb. 2007, but dependent on when field data is collected)

Following integration of collected field data with previously selected data sets and selection of appropriate analytical techniques, the BT staff will conduct a set of ecological analyses to describe the abundance and distribution of key species and physical and oceanographic variables. The complexity and nature of specific analyses will depend upon the availability of appropriate data sets and input from project partners, but may include characterization of benthic habitats and land cover (present and historic), species distributions, species habitat affinities, measures of community structure, and the distribution of human and military activities in relation to habitats and species distributions.

Task 6 Products:

- Quantitative and qualitative assessment results that specify habitat utilization patterns and bio-physical interrelationships of single species, species assemblages, and measures of community structure within the study area defined by available data
- Comparison of the above results over space and through time
- Quantitative and qualitative assessments describing the physical and oceanographic character within the study area

Task 7. Development of Products for Review
(Estimated completion date: March 2007)

Draft species, habitat, and analysis maps coupled with statistical results will be made available to NOAA/OR&R staff and other regional experts for review in a workshop format. In addition, a report will be developed that provides information on the results of the analyses that can be integrated into Vieques restoration/management plans currently being developed. The report will also include a strategy for continuing monitoring efforts.

Task 7 Products:

- Interim analytical results and GIS products (maps, statistical results)
- Recommendations for future monitoring needs and strategy
- A list of comments and questions for reviewers
- A brief status report

Task 8. Incorporate Review Comments and Present/Deliver Final Results
(Estimated completion date: April 2007)

Once products have been reviewed by NOAA/OR&R and other regional experts, the BT staff will incorporate review comments and prepare final products in an appropriate format.

Task 8 Products:

- A final summary report describing the analysis, results, and interpretation of the results
- A GIS on species, habitats, and important biological areas in the study area
- A DBMS with data and information on species and habitats

- A map and/or list of data gaps

Task 9. A Web Site for the Characterization
(Estimated completion date: Ongoing throughout the duration of the project)

The website will provide background information, updates, and interim products on the Vieques characterization. It will also be used for analytical and product review.

LITERATURE CITED

Geo-Marine. 2003 Reef Ecosystem Baseline Assessment Survey and Monitoring, Vieques Island, Naval Station Roosevelt Roads, Puerto Rico. Prepared by Geo-Marine, Plano, TX. Naval Facilities Engineering Command, Atlantic Division.

SCHEDULE

See Figure 3 for proposed project process and schedule.

PROJECT PERIOD

April 2006 through April 2007

PROJECT TEAM

The CCMA Biogeography Team of the National Centers for Coastal Ocean Science (NCCOS) will lead this collaborative effort.

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PERSONNEL ALLOCATIONS

Please refer to Table 1 for the expected allocation of personnel by task.

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Figure 1. Map of Vieques, Puerto Rico study area.

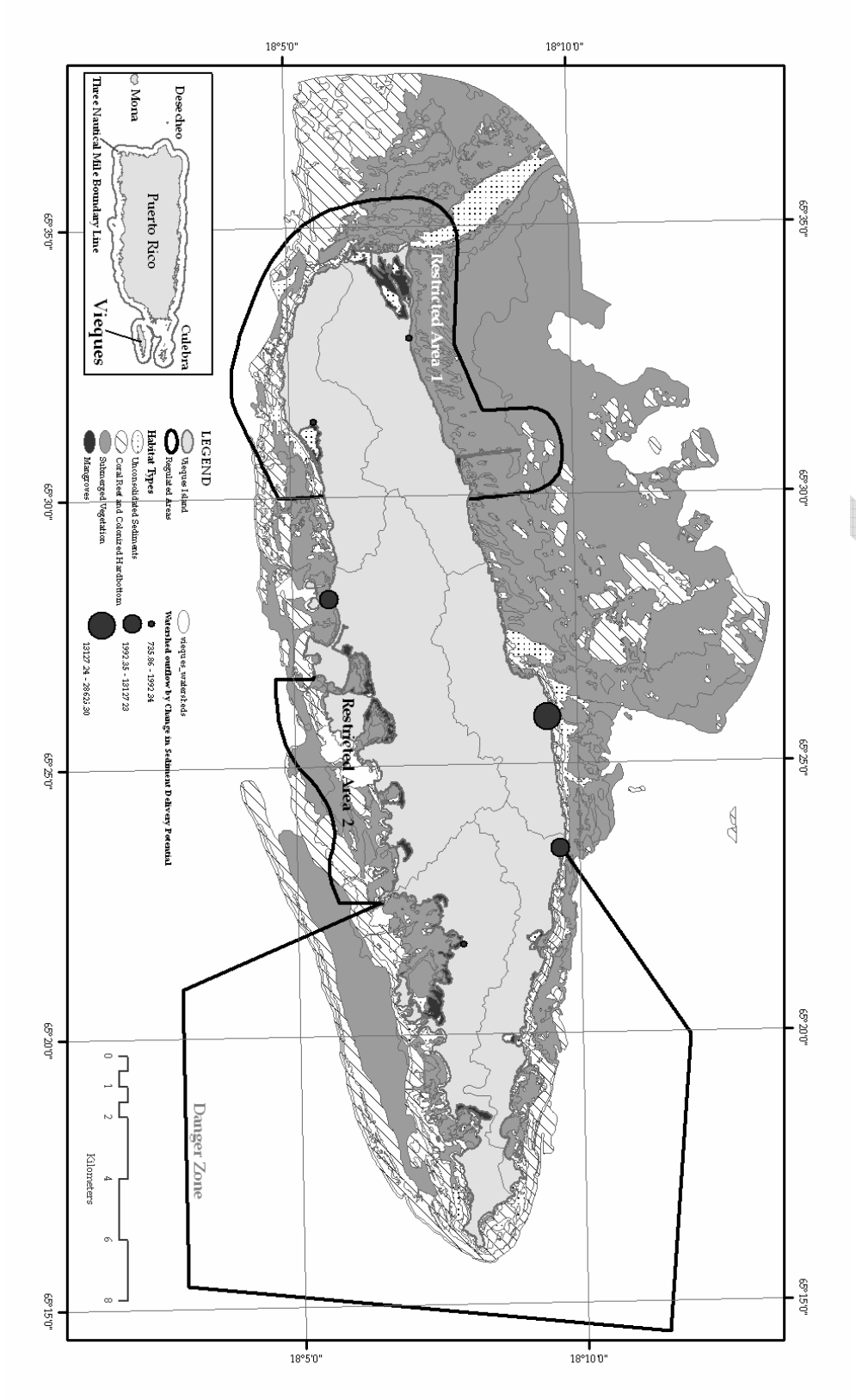

Figure 2. NOS's assessment approach

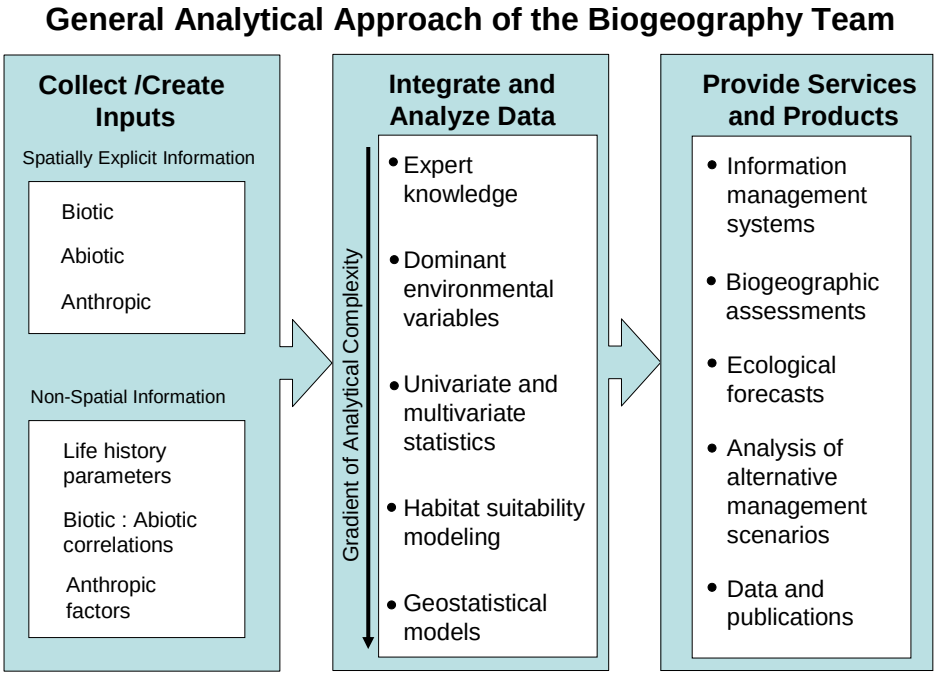

Figure 3. Schedule

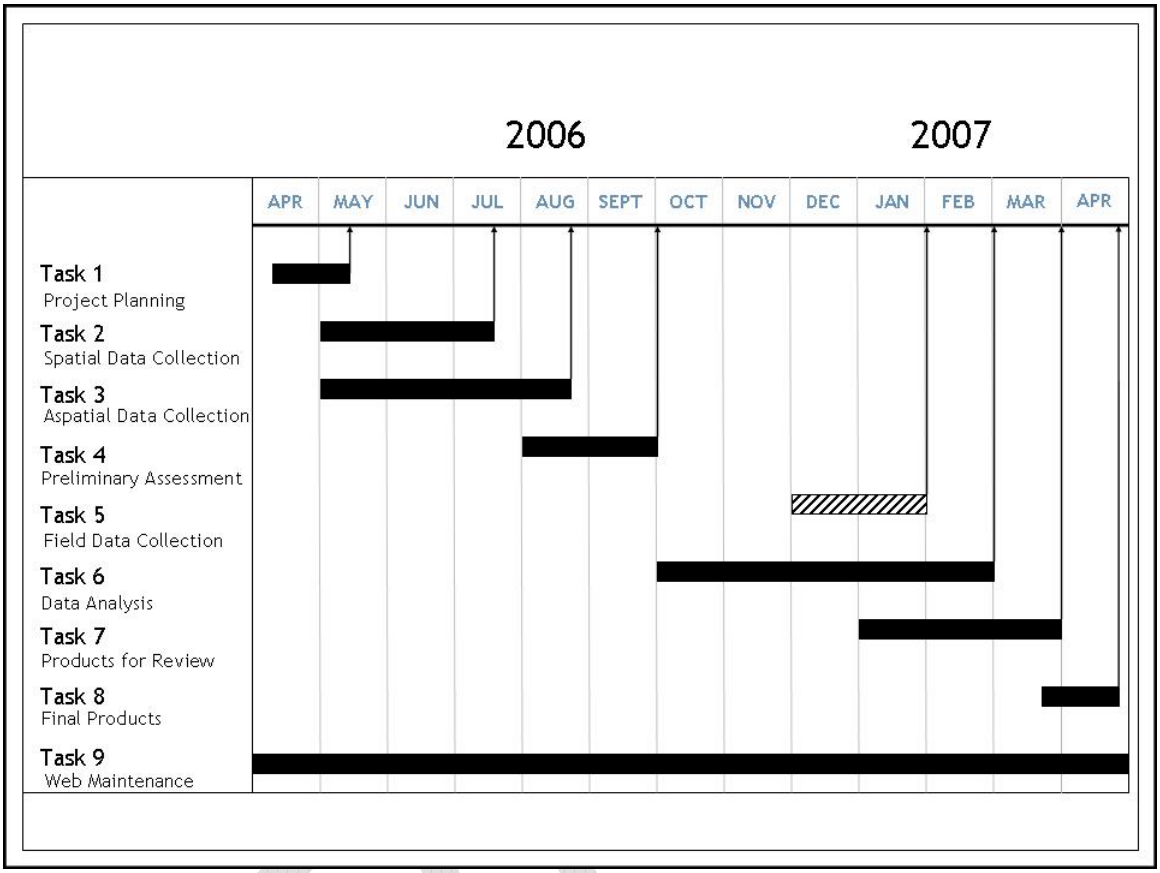

Table 1. Personnel allocation for NCCOS by task item. An “X” denotes expected participation in the task.

	Task 1: Project Planning	Task 2: Collection of Spatial Data	Task 3: Collection of Aspatial Data	Task 4: Preliminary Assessment	Task 5: Field Data Collection	Task 6: Data Analysis	Task 7: Development of Products for Review	Task 8: Final Products	Task 9: Web Maintenance	Estimate of Percent of Time Per Month
Laurie Bauer	X	X	X	X	X	X	X	X	X	50
Matt Kendall	X			X	X	X	X	X		20
Charlie Menza		X	X	X	X	X	X	X		40
Kimberly Foley		X	X	X	X	X	X	X		30
Mark Monaco	X						X			5
Ken Buja						X			X	10
Tim Battista					X					5
Jamie Higgins							X	X		10
Chris Caldow					X					5
Randy Clark					X					5
Kimberly Woody					X					5
Tom McGrath									X	5